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EDITORIAL

Do we need an international panel on biodiversity change?

JAN BOERSEMA, ANDREW BLOWERS, & ADRIAN MARTIN

Human enhanced climate change and loss of biodiversity are considered the most pressing environmental problems on a global scale. The international community addressed both in two important agreements that resulted from the Earth Summit in Rio 1992: the Convention on Biological Diversity (CBD) and the Framework Convention on Climate Change (FCCC). The FCCC built on a strongly organised scientific community and on the Intergovernmental Panel on Climate Change (IPCC). The CBD, however, is lacking a mechanism akin to the IPCC. In this editorial, we will summarise and discuss important similarities and differences between these two problems. We will argue that both the similarities and even more so the differences provide ample arguments in favour of a recent plea for the establishment of such an international panel on Biodiversity Change (Loreau 2006).

Similarities

To start with, both problems concern phenomena which by nature are dynamic. Both, climate and biodiversity are subject to long term changes: in the course of its history the earth has experienced a large number of changes in its climate, such as ice ages, and in the diversity of species, such as mass extinctions. With regard to biodiversity, these negative changes were always followed by a period of recovery. If one considers the whole history of life on earth, one may even discern an ascending line: in the course of evolution, the diversity of species has never been as large as it is in the geological era in which we are living now. Thus, the problem does not lie in the changes themselves but rather in the scope and the speed in which these changes are affected and accelerated by humans, after all a relatively new arrival. In its capacity of being an ‘agent of change’, the human species has already established a robust reputation in its history, especially with regard to its driving away and eradicating animal species, but during the last centuries its influence has increased exponentially as the Millennium Ecosystem Assessment tells us (Reid 2005).

A second feature that these global problems have in common is their enormous complexity. In fact, they are keywords for problem areas that contain a variety of regional changes and sub-problems. Moreover, not all of the changes are adverse. In addition, different groups in society may regard advantages and disadvantages differently. Winegrowers in the Netherlands have fewer objections to the warmer weather than the inhabitants of the islands in the Indian Ocean who are forced to leave their habitats or face the risk of disaster due to the rising sea level.

A third feature these changes have in common regards the uncertainty is the state of knowledge about the underlying system and as a consequence, our uncertainty about the results of the changes in those systems. This lack of knowledge has a provisional character: we

do not have the knowledge yet but it is within reach. There will also be that knowledge or indeterminacy which is, as yet, beyond comprehension due to practical reasons (money, manpower, time) or due to principles (breaches of trends, inherent unpredictability).

Finally, the problems resemble each other because of being interwoven with other social issues and interests. This interconnection occurs on all levels and causes most problems when there appear to be conflicts of interest. For example, the alleviation of poverty may require changes in land use at the expense of the biotopes of species of plants and/or animals, or the reduction of CO₂ emission may be an obstacle for reaching economic goals – ‘may’, because in these domains it remains to be seen whether the alleged trade-offs are real, avoidable or fictitious.

So far, the four similarities can be identified as: the accelerating pace of change; the unevenness of change; the uncertainty of change and the interaction with social change.

Given the seriousness of the possible consequences of the changes, these characteristics all support the need to enhance international efforts towards greater unity of our scientific understanding, and increase the capacity for reinforcing the measurements and integration of policies.

Differences

However, apart from similarities there are remarkable differences as well. These differences also underline the need for biodiversity science to evolve towards greater unity and integration.

To start with, if we compare climate with biodiversity. The former is a more widely and longer described phenomenon. The units with which it is measured are known and well-defined, and in some instances have been determined and reported in a reliable manner for centuries. For biodiversity this holds true to a much lesser degree. There is agreement with regard to the fact that there is diversity at three levels: there is a level within the species (genetic diversity), there is the one among different species and the one among different ecosystems. However, the manner in which this is measured is not at all unequivocal. Especially in ecosystems, neither the compilation nor the definition is focussed. With species and genes, the enormous numbers of already known and the even larger numbers of unknown ones block the view of the overall diversity. The number of species which have been described, amount to about 1.5 million world-wide, whereas the estimated total number of species varies widely from 10 to even 30 millions, with 14 million species at present as most reliable figure (Hawksworth & Kalin-Arroyo 1995). For this reason, the discussion about the loss of biodiversity is very concrete on the one hand – endangered species, such as the Siberian tiger and the mountain gorilla vividly appeal to our imagination. On the other hand, it is very abstract. It is plausible that certain species become extinct, although we know of their existence only in theory. This is especially likely with insects and myriapods which make up by far the bulk of species.

A second point relates to the fact that policy making, especially in the case of biodiversity, tends to be delivered on a regional basis. A decrease of biodiversity on a global scale and certainly with the speed which we observe at the moment, may be deplored for good reasons. But how can this be translated on a regional scale? The CBD has been ratified by separate states and according to the treaty, these ought to protect the biodiversity in their territories. How sensible is this for small countries which have many migrating birds and mammals? Implementing conservation through states creates problems while ecosystems do not correspond with state boundaries. Moreover, many policies are based on the assumption that a (regional) decrease of biodiversity is bad and an increase is good. However, for specific

ecosystems this is not the case at all. The Arctic areas accommodate by nature very few species due to the extreme climate to which only a few species are adjusted. This is what makes them so special. Therefore, the desire to increase biodiversity does not make sense in every location. Presumably, sustaining biodiversity seems to be a more appropriate objective. But how is it to be measured and at what spatial scales?

Thirdly, the units by which biodiversity may be measured, the species, do not have an equal value in terms of ecology. From a biological perspective, there are large differences among species with regard to their importance within and for the ecosystems in which they occur. A meta-analysis of experimental studies addresses the relationship between species diversity and ecological functioning, and concludes that reduction in species loss does affect ecological functioning, but that the magnitude of these effects depends on which species are actually lost (Cardinale et al. 2006). To put it simply: certain species disappear without having a noticeable consequence for other species or the ecosystem of which they are a part; most of them have a limited influence, certain changes take place, there is a rearrangement of the network which is made up by species, and finally a number of species turn out to occupy a key position. If species which hold a key position disappear, the systems which they were part of change in a short period to such an extent that we may speak of a collapse. Because of this, it is difficult to translate the general global goal of 'maintaining biodiversity' into a concrete policy at a lower, regional or national level. It is unclear which criteria are suitable for determining the 'quality' of biodiversity.

A term that is often used in this connection is 'hotspot' which usually refers to a number of different species in a certain region. Adopting the number of different species as a metric means: the more species, the hotter. Usage of this criterion is widespread; it designates parts of the tropical rain forest as hotspots. However, if we want to take into account the uniqueness of species and the unequal spreading, the number of endemic species appears to be a defensible criterion as well. Moreover, species which occur in a limited area are usually especially vulnerable. Isolated areas, islands and mountains have the most endemic species. Applying this metric eventually results in hotspots of endemics. Madagascar and the mountain ranges in Peru are known for such hotspots. A third criterion which presents itself is the number of endangered species. This seems to be a logical choice since it measures directly what is central to the policy of biodiversity, namely the species which need protection.¹ Focussing on endangered species leads to the so-called 'red list' which the IUCN publishes regularly and which contains species which have the status of being endangered (Butchart et al. 2004). This list is made by using five criteria and the lowest score determines the status.

Recently, a study has been carried out in which the above indicators are applied and compared for avian hotspots (Orme et al. 2005). A global database was used of all known extant bird species using a grid resolution comparable to 1° latitude × 1° longitude. The study defined hotspot as the richest 2.5% of grid cells with respect to species richness, threat and endemism resulting in 490 grid cells for species richness, 533 for threatened species and 508 for endemism. It became clear that among these three metrics, there was only a very small congruity, measured as a spatial overlap. Of the 1531 grid cells 1051 (83%) did not show any overlap, 192 were shared between pairs of hotspot type and only 32 grid cells (2.5%) were common to all types. Cumulatively, the three sets of hotspots occupied 1275 grid cells. All of the 32 congruent hotspot grid cells were located in the Andes Mountains.

To complicate things even further, shortly afterwards a study was published in which non-marine species had been investigated which ran the highest risk of becoming extinct in the nearby future, the latent extinction risk (Cardillo et al. 2006). This study applied the criterion

¹It turns out to be a reasonably successful measure as well. Cf. Rodrigues 2006.

of the speed with which the habitat was affected, one of the five criteria which are used for determining the red list. In this study it became clear that the Arctic region has to be called a hotspot. The fast changes which may be observed in that region and which are the result of the increasing temperatures constitute a major threat to the animals which depend on the ice cap for their survival.

The choice of criteria determines the result in terms of species which are to be protected and the terminology which is used in connection with 'hotspot' may apparently cover a very large variation of hotspots. One point that is directly related to this is the reliability of the data and the consistency in the compilation of data. In this area, the IUCN plays a key role. For many years it has been collecting and editing the data, aided by a host of volunteers and experts. It offers the best we may have at this moment, although much remains to be improved. It is a hybrid organisation, though. The IUCN is a kind of NGO (non governmental organisation) which nonetheless has country representatives as members. At the same time, in its capacity of being a federation of organisations which want to protect nature it needs to defend a number of different issues. Where economic or political conflicts arise about the interpretation and application of data, this may generate an adverse affect. The boundary between sustainable and unsustainable use might be exceeded. There is an increasing possibility of this happening, because the objectives of the CBD are threefold: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising from commercial and other utilization of genetic resources. This last concept is specifically intended to ensure that indigenous people are not 'robbed' by foreign or native 'bio-pirates' of the natural resources in their habitat. These three objectives are not always reconcilable; they are exposed to a robust internal tension, the more so, now that in many areas biodiversity is subject to high pressure (Reid 2005).

Summarising the differences reveals the difficulties encountered in attempting to achieve accurate measurement of biodiversity. Compared to climate change we lack a clear picture of what is meant by biodiversity in terms of units by which it is measured. Even if species are chosen as the metric different criteria are in use and putting these into practice points to different regions as being hotspots, with little overlap. As to the agreements all species are equal but ecologically speaking some are more equal than others. If choices are to be made, this poses problems to the policy makers. Making choices seems to be inevitable if sustaining biodiversity in all places and at all times turns out to be unachievable. Therefore, the science of biodiversity needs to evolve towards greater consensus and integration. Putting a Panel in place that brings together all expertise on the right level would give great impetus to this process.

The above-mentioned gaps in our knowledge of climate change and biodiversity as well as the seriousness of the possible consequences demand a strong international representation of both of these issues at the international level. For a number of years, climate change is better served due to the founding of the IPCC. For that reason, in the journal *Nature*, recently an article was published which pleaded in favour of setting up an 'International Panel on Biodiversity' which might have a comparable structure, mode of operation and status as the IPCC (Loreau et al. 2006). According to Loreau *et al.*, such a Panel should be funded by and have formal links to Governments, and should be objective, independent and transparent. It should provide rigorous and updated scientific information in support of policy decisions to ensure that negotiations are based on validated information.

The similarities between the two major environmental problems already offer arguments in favour of this proposal. Even more so do the described differences and difficulties in assessing the loss of Biodiversity properly and translating the data into aggregated metrics.

Meanwhile, the French government is funding a consultation process for assessing the scope and possible models for an international mechanism of scientific expertise on

biodiversity (IMoSEB). An initiative that deserves to be endorsed. Curbing the ongoing loss of our biological diversity is important enough to make it a success.

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